CLAIMS

What is claimed is:

1. A voltage controlling device for controlling voltage provided to at least one suspended particle device (SPD) which comprises:

an AC terminal adapted to receive an AC voltage at a specific frequency;

a voltage dividing device adapted to divide the AC voltage into a plurality of distinct voltage values within a predetermined range;

a measurement device adapted to provide measurement information related to the surface area of the SPD;

a controller adapted to control the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information; and

an SPD terminal adapted to provide the selected voltage value to the SPD.

2. The voltage controlling device of claim 1, wherein the voltage dividing device further comprises:

a capacitor array including a plurality of capacitors where each capacitor in the capacitor array has a predetermined capacitance; and

a switch array, connecting each capacitor of the capacitor array to the SPD terminal such that each switch of the switch array connects one capacitor of the capacitor array to the SPD terminal, wherein

the controller controls the switches of the switch array to connect at least one of the capacitors of the capacitor array to the SPD terminal based on the voltage level information and the measurement information.

3. The voltage controlling device of claim 2, further comprising an input device adapted to allow a user to input and adjust the voltage level information.

4. The voltage controlling device of claim 3, wherein the measurement device is connected electrically in series with the SPD terminal.

5. The voltage controlling device of claim 4, wherein the measurement device further comprises a current sensing resistor providing voltage drop information regarding a voltage drop across the current sensing resistor.

6. The voltage controlling device of claim 5, wherein the controller determines the surface area of the SPD based on the voltage drop information.

7. The voltage controlling device of claim 6, wherein the controller stores information related to a relationship between adjustments of the voltage level information made via the input device and the selected voltage level for SPDs having a plurality of different surface areas.

8. The voltage controlling device of claim 7, wherein the controller optimizes the relationship between the adjustments of the voltage level information made via the input device and the selected voltage level provided to the SPD terminal based on the determined surface area of the SPD.

9. The voltage controlling device of claim 8, wherein the controller linearizes the relationship between the adjustments made via the voltage level information and the selected voltage level provided to the SPD terminal such that

as the user adjusts the voltage level information via the input device, the selected voltage level supplied to the SPD terminal changes in a substantially linear fashion.

10. The voltage controlling device of claim 9, wherein the controller receives the measurement information from at least one slave voltage controlling device and provides control information to a slave controller of the slave voltage controlling device based on the voltage level information and the measurement information from the slave voltage controlling device.

11. The voltage controlling device of claim 10, wherein the controller stores relationship information regarding the relationship between adjustments made to the voltage level information made by the user via the input device and the selected voltage supplied to the SPD terminal for a plurality of different types of SPDs.

12. The voltage controlling device of claim 11, wherein the controller optimizes the relationship between adjustments made to the voltage level information made by the user via the input device and the selected voltage supplied to the SPD terminal based on selection information indicating an SPD type.

13. The voltage controlling device of claim 12, wherein the selection information is provided by the user utilizing a selection device.

14. The voltage controlling device of claim 13, wherein the selection device is set in advance utilizing the selection device.

15. The voltage controlling device of claim 5, wherein the controller controls the switch array to disconnect at least one capacitor of the capacitor array from the SPD terminal when the voltage drop information indicates that the voltage drop across the current sensing resistor is above a predetermined level.

16. The voltage controlling device of claim 15, wherein the controller reconnects the at least one capacitor of the capacitor array to the SPD terminal after a predetermined period of time has passed.

17. The voltage controlling device of claim 16, wherein the controller reconnects the at least one capacitor of the capacitor array to the SPD terminal when the voltage drop information indicates that the voltage drop across the current sensing resistor is below the predetermined level.

18. The voltage controlling device of claim 17, wherein the controller receives the measurement information from at least one slave voltage controlling device and provides control information to a slave controller of the slave voltage controlling device based on the voltage level information and the measurement information from the slave voltage controlling device.

19. A method of controlling voltage provided to a suspended particle device (SPD), which method comprises:

receiving an AC voltage at a specific frequency;

dividing the AC voltage into a plurality of distinct voltage values within a predetermined range using a voltage dividing device;

determining measurement information related to the surface area of the SPD using a measurement device;

controlling the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information; and

providing the selected voltage value to an SPD terminal connected to the SPD.

20. The method of claim 19, wherein the dividing step further comprises:

providing a capacitor array including a plurality of capacitors, where each capacitor in the capacitor array has a predetermined capacitance; and

connecting each capacitor of the capacitor array to the SPD terminal via a switch array, such that each switch of the switch array connects one capacitor of the capacitor array to the SPD terminal, wherein

the switch array is controlled such that switches of the switch array connect at least one of the capacitors of the capacitor array to the SPD terminal based on voltage level information and the measurement information.

21. The method of claim 20, which method further comprises allowing a user to input and adjust the voltage level information utilizing an input device.

22. The method of claim 21, wherein the measurement device is connected electrically in series with the SPD terminal.

23. The method of claim 22, which method further comprises receiving voltage drop information from a current sensing resistor of the measurement device, where the voltage

drop information indicates a voltage drop across the current sensing resistor.

24. The method of claim 23, wherein the controlling step further comprises calculating a surface area of the SPD based on the voltage drop information.

25. The method of claim 24, wherein the controlling step further comprises storing relationship information related to a relationship between adjustment of the voltage level information made via the input device and the selected voltage level provided to the SPD terminal for SPDs having a plurality of different surface areas.

26. The method of claim 25, wherein the controlling step further comprises optimizing the relationship between the adjustment of the voltage level information made via the input device and the selected voltage level provided to the SPD terminal based on the determined surface area of the SPD.

27. The method of claim 26, wherein the controlling step further comprises linearizing the relationship between the adjustment made via the voltage level information and the selected voltage level provided to the SPD terminal, such that, as the user adjusts the voltage level information via the input device, the selected voltage level supplied to the SPD terminal changes in a substantially linear fashion.

28. The method of claim 27, wherein the controlling step further comprises receiving measurement information from at least one slave voltage controlling device and providing control information to a slave controller of the slave voltage controlling device based on the voltage level information and

the measurement information from the slave voltage controlling device.

29. The method of claim 28, wherein the controlling step further comprises storing relationship information regarding the relationship between adjustment of the voltage level information made by the user via the input device and the selected voltage supplied to the SPD terminal for a plurality of different types of SPDs.

30. The method of claim 29, wherein the controlling step further comprises optimizing the relationship between adjustment to the voltage level information made by the user via the input device and the selected voltage supplied to the SPD terminal based on selection information indicating an SPD type.

31. The method of claim 30, wherein the selection information is provided by the user utilizing a selection device.

32. The method of claim 31, wherein the selection information is provided in advance and stored.

33. The method of claim 23, wherein the controlling step further comprises disconnecting at least one capacitor of the capacitor array from the SPD terminal when the voltage drop information indicates that the voltage drop across the current sensing resistor is above a predetermined level.

34. The method of claim 33, wherein the controlling step further comprises reconnecting the at least one capacitor of

the capacitor array to the SPD terminal after a predetermined period of time has passed.

35. The method of claim 34, wherein the controlling step further comprises reconnecting the at least one capacitor of the capacitor array to the SPD terminal when the voltage drop information indicates that the voltage drop across the current sensing resistor is below the predetermined level.

36. The method of claim 35, wherein the controlling step further comprises receiving measurement information from at least one slave voltage controlling device and providing control information to a slave controller of the slave voltage controlling device based on the voltage level information and the measurement information from the slave voltage controlling device.

37. A voltage controlling device for controlling voltage provided to at least one suspended particle device (SPD) which comprises:

an AC terminal adapted to receive an AC voltage at a specific frequency;

a voltage dividing device adapted to divide the AC voltage into a plurality of distinct voltage values within a predetermined range;

a measurement device adapted to provide measurement information related to the surface area of the SPD;

a controller adapted to control the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information, wherein the controller optimizes a relationship between adjustments to the voltage level information and the selected voltage value; and

an SPD terminal adapted to provide the selected voltage value to the SPD.

38. A method of controlling voltage provided to a suspended particle device (SPD), which method comprises:

receiving an AC voltage at a specific frequency;

dividing the AC voltage into a plurality of distinct voltage values within a predetermined range using a voltage dividing device;

determining measurement information related to the surface area of the SPD using a measurement device;

controlling the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information and optimizing a relationship between adjustments made to the voltage level information and the selected voltage value; and

providing the selected voltage value to an SPD terminal connected to the SPD.

39. A voltage controlling device for controlling voltage provided to at least one suspended particle device (SPD) which comprises:

an AC terminal adapted to receive an AC voltage at a specific frequency;

a voltage dividing device adapted to divide the AC voltage into a plurality of distinct voltage values within a predetermined range;

a measurement device adapted to provide measurement information related to the surface area of the SPD, wherein the measurement device includes a current sensing resistor providing voltage drop information indicating a voltage drop across the current sensing resistor;

a controller adapted to control the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information, wherein the controller controls the voltage dividing device to reduce the selected voltage value when the voltage drop information is above a predetermined level; and

an SPD terminal adapted to provide the selected voltage value to the SPD.

40. A method of controlling voltage provided to a suspended particle device (SPD), which method comprises:

receiving an AC voltage at a specific frequency;

dividing the AC voltage into a plurality of distinct voltage values within a predetermined range using a voltage dividing device;

determining measurement information related to the surface area of the SPD using a measurement device and including voltage drop information indicating a voltage drop across a current sensing resistor;

controlling the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information, wherein the selected voltage value is reduced when the voltage drop information is above a predetermined level; and

providing the selected voltage value to an SPD terminal connected to the SPD.

41. A voltage controlling device for controlling voltage provided to at least one suspended particle device (SPD) which comprises:

an AC terminal adapted to receive an AC voltage at a specific frequency;

a voltage dividing device adapted to divide the AC voltage into a plurality of distinct voltage values within a predetermined range;

a measurement device adapted to provide measurement information related to the surface area of the SPD, wherein the measurement device includes a current sensing resistor providing voltage drop information indicating a voltage drop across the current sensing resistor;

a controller adapted to control the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information, wherein the controller optimizes a relationship between adjustments to the voltage level information and the selected voltage value, and further controls the voltage dividing device to reduce the selected voltage value when the voltage drop information is above a predetermined level; and

an SPD terminal adapted to provide the selected voltage value to the SPD.

42. A method of controlling voltage provided to a suspended particle device (SPD), which method comprises:

receiving an AC voltage at a specific frequency;

dividing the AC voltage into a plurality of distinct voltage values within a predetermined range using a voltage dividing device;

determining measurement information related to the surface area of the SPD using a measurement device and including voltage drop information indicating a voltage drop across a current sensing resistor;

controlling the voltage dividing device to provide a selected voltage value based on voltage level information and the measurement information, wherein a relationship between adjustments made to the voltage level information and the

selected voltage value is optimized and wherein the selected voltage value is reduced when the voltage drop information is above a predetermined level; and

providing the selected voltage value to an SPD terminal connected to the SPD.